ELEMENT 4

The process for updating and maintaining Water Quality Management (WQM) plans, including schedules for revision

---

Summary – *This element identifies the basic activities/processes for updating and maintaining the department's water quality management planning effort summarized below.*

Designated regional agencies and local communities accomplish area-wide, waste-treatment management planning. The program prioritizes and facilitates the implementation of wastewater treatment collection systems annually in its Intended Use Plan (IUP) through federal and state grants and loans. Engineering reviews the technical requirements for wastewater treatment systems. The planning section's continual basin planning efforts provide a framework in which the department can update its regulatory controls and continue to examine the overall water quality control effort of the program. Basin plans are totally updated approximately every seven years, and as they are updated, they are placed on the department's Web site. One of the goals of the department's basic water quality management planning activities is to maintain Water Quality Standards (WQS) and criteria. This is best accomplished through continued monitoring of the state's water bodies, identifying the extent of water quality impairment and the assessment of the point and nonpoint source pollution involved, and recognizing any natural causes that exist. As population trends vary across the state and statewide priorities are modified, water quality planning makes extensive use of monitoring and assessment for nonpoint source as well as point source control needs. This element lists the activities of the program for point and nonpoint source monitoring and assessment. Enhanced statewide water quality management processes will continue based on inspection, enforcement, permitting and the written plans for water bodies being formulated under the required Total Maximum Daily Load (TMDL) planning efforts. These several processes enable the department to evaluate water quality and prioritize watersheds affected by nonpoint and point source pollution over the next five years. The department's general strategies are listed at the end of Element 4.

Continuous Water Quality Planning

A national plan enacted to clean up the nation's waters, the Federal Pollution Control Act, became federal law in 1972 and has been amended several times. Most commonly referred to as the Clean Water Act (the Act), the law mandated the elimination of water pollution. Two general goals of the Act, to be achieved across the board, have been to provide clean water for swimming and other recreational uses and for the protection and propagation of fish, shellfish and wildlife.

Once approved by the Clean Water Commission, it was the implementation of the Missouri Water Quality Management Plan of 1979 that marked the beginning of area-wide waste treatment throughout the state. The Missouri Water Quality Management Plan of 1979 as well as the program's continuing water quality management planning today address both point and non-point sources. Since 1979, the state's basic water quality management planning efforts have included area-wide waste treatment planning, originating under section 208 of the Clean Water

Act and basin planning under section 209. Designated regional planning authorities for the City of St. Louis, Franklin, Jefferson and St. Charles counties, as well as Jackson, Cass, Clay Ray, Platte counties together with portions of Newton and Jasper counties come under section 209.

In the early years of the Clean Water Act, it was area-wide waste treatment and collection systems (sewer systems) and point sources of pollution that received the most attention in many state programs. Point sources were and are controlled by permits and are monitored to insure compliance with regulations. Point sources are easy to identify and are the sources of very real problems. Billions of tax dollars have been spent nationwide to build industrial and domestic wastewater treatment facilities as well for other point source reductions to water pollution. Since 1987, as required under Title VI of the Clean Water Act, the state prepares the Intended Use Plan that serves as a basis for distributing the anticipated Clean Water State Revolving Funds (CWSRF) available for financing wastewater treatment facilities in Missouri. The Water Pollution Control Program is the agency delegated the authority to administer the federal CWSRF funds. These funds are used in perpetuity for low interest loans.

Water quality analysis made during the development of Missouri's original basin plans as approved in 1979 resulted in the identification of water pollutants that were expected to be in excess of state Water Quality Standards after implementation of point source controls. While point source controls have been and are implemented through Missouri's administration of the National Pollutant Discharge Elimination System (NPDES), (See Element 1), violations of Water Quality Standards occur chiefly as a result of a few point source discharges. A far greater number of violations are resulting from nonpoint sources and are harder to control than those from point source pollution.

Water quality analysis for nonpoint source pollution is currently being combined with what is known about point source pollution into plans called Total Maximum Daily Loads. The Clean Water Act requires Water Quality Standards to protect the sensitive and beneficial uses of the waters to prevent them from becoming impaired. When waters do not meet standards a Total Maximum Daily Load (TMDL) plan is written for the impaired water body. A margin of safety is included to account for any uncertainties in the system. The more uncertainty that exists in a particular watershed or for a particular water body segment, the wider the margins for safety. Fully adequate monitoring and assessment helps to reduce uncertainty and provides for better water quality management and planning.

This element describes a number of water quality management planning activities underway in the Water Pollution Control Program that are basic to the department's continuing planning process activities. The Continuing Planning Process focus in this element is described in the following:

1) area-wide waste treatment and collection,
2) basin planning,
3) financial planning through the development of the state's Intended Use Plan,
4) watershed planning and restoration,
5) nonpoint source management planning,
6) monitoring, assessment and compliance,
7) engineering,
8) geographic information system (GIS) planning,

9) water quality information system planning
10) grants and loans,
11) concentrated animal feeding operation management,
12) mining and silviculture,
13) the State Water Plan and
14) the department's general strategies.

The activities described under Element 4 provide an update to the water quality planning and management requirements under Sections 208 and 209 of the Clean Water Act as well as Section 303(e). (See Element 2, Sections 208 and 209.) These processes assist the department in evaluating water quality and prioritizing watersheds affected by nonpoint and point source pollution.

Area-Wide Waste Treatment Management Planning

Section 208 of the Clean Water Act directed states to designate area-wide waste treatment management planning agencies. Section 201 directed states to develop waste treatment plans and practices for the construction of treatment works needed to meet municipal and industrial needs, or facilities planning. This occurred in the development of the 1979 plan. Today the program prioritizes and facilitates the implementation of wastewater treatment through its Intended Use Plan and grants and loans. Planning for area-wide waste treatment is implemented through designated regional agencies and local communities. Engineering staff review the technical requirements for facility wastewater treatment systems to make sure they meet the state Water Pollution Control Program water quality goals.

In 1981, funding under Section 208 ended. Since that time Missouri's efforts under Section 208 for water quality management planning have been curtailed. The state's Clean Water State Revolving Fund loan and grant programs comprise the funding sources for the Water Pollution Control Program's financial planning activities today. The Missouri State Revolving Fund Program was established with the phase out of federally funded construction grants programs under the Clean Water Act of 1987. The department coordinates its work with various agencies providing grants and loans to designated regional agencies and to local communities to develop efficient area-wide waste treatment management and collection systems.

Federal regulations also require water quality management plans to address nonpoint source pollution from construction activities, mining and silviculture, as well as the ongoing planning under the NPDES permitting process for control of point source activities, (Element 1) and the development of TMDLs, including nonpoint and point sources, (Element 3).

Basin Planning

Section 209 of the Clean Water Act directs that basin plans be prepared under the Water Resources Planning Act. Water Quality Basin Plans were prepared and first published in 1976 and then incorporated into the Water Quality Management Plan of 1979. Current Missouri Basin Plans are the updates to the initial water quality basin plans and information published by the department in 1979. These plans identified water quality problems including the impaired waters. Individual basin plans are updated periodically while the updating of the entire set of plans through revisions occurs about every seven years. Basin plans identify water quality

problems from point and nonpoint sources within the basin. The Clean Water Act section 319 funding is used to address nonpoint source problems preventing the achievement of the Water Quality Standards in Missouri water bodies. The public may attend and participate in the basin planning effort through the Water Quality Coordinating Committee Meetings held monthly in Jefferson City and Columbia. Contact the department at (573)751-1300 or through cleanwater@dnr.state.mo.us for dates and times of meetings.

Basin plans for Missouri are currently being updated to include all data available (quantitative and qualitative) that has been quality assured. The planning section's continual basin planning efforts provide information that allows the department to review the overall effectiveness of the program. As the basin plans are completed, they are posted on the Department of Natural Resources Web site under "Water." They are continuously updated under the continuing planning process requirement of Section 303(e) for current planning information. A pilot project reflecting the Water Pollution Control Program's ongoing basin planning effort is now on the department's Web site. Three updates to the White River Basin Plans were prepared in 1999 with most all basin plans scheduled to be updated by as early as 2006.

By accessing the department's Web site at http://www.dnr.state.mo.us/deq/wpcp/basin-plans/basins-main.htm it is possible to view the pilot project reflecting the Water Pollution Control's Basin Planning process. The Web version of basin planning contains narratives, maps, water quality data and management needs for Missouri's major water basins. Basin planners use the 8-digit Hydrologic Unit Code (HUC8) to label basins. More detailed sub-basins are defined as HUC11's and HUC14's. HUC8 basins are grouped in larger regional basins as is the case for the department's first project completed in 2000 for the White River Basin, including Table Rock Lake, James River and White River (Taneycomo and Bull Shoals Lakes). Each HUC8 will have its own Web page and can be reached through a regional basin page that is also mapped and listed.

Of Missouri's 66 8-digit hydrological units, 56 are identified as Category I (high priority) Watersheds. These 56 were evaluated and prioritized. Five watersheds were identified as priorities for restoration work in late 1999 and in 2000, for a total of 10 watersheds. The use of the HUC8 poses a significant challenge when using the Unified Watershed Assessment (UWA), (discussed under Watershed priorities) as a secondary tool.

Basin plans are being updated for each basin with a water body that requires a TMDL study. Revisions to updated basin plans may or may not reflect the actual progress in TMDL development and implementation as the basin plans. The state's 303(d) impaired waters list contains the impaired waters for which the TMDL plans are prepared. Basin plans do provide relatively recent background data for the basin area. Basin plans are formulated for all waters of the state. Comments to these plans receive consideration in the continuous basin planning effort. Basin plans are published and available in hard copy and are in the process of being added to the department's Web site.

Proposed pollution reduction strategies will make use of and track-specific measures and include milestones to evaluate progress. TMDL plans, for instance, include schedules for completion and measurable milestones in the implementation plan. In addition, a "tasks" database is kept within the department's program listing all impaired water bodies, activities/milestones and year

completed. It is planned for this information and several other databases to be combined into a master database with information on all impaired water bodies. This network being developed will be the complete source for tracking information and related activities. The department has linked permitted discharges and stream segments, allowing immediate identification of discharges of pollutants to a particular water body.

References

Water pollution control basin plans can be found at http://www.dnr.state.mo.us/deq/wpcp/basin-plans/basins-main.htm information on additional basin plans and ongoing basin planning effort is available upon request from the Water Pollution Control Program.

Finance: Missouri's Intended Use Plan

The Missouri Department of Natural Resources' Water Pollution Control Program is the agency delegated the authority to administer federal funds made available by the Environmental Protection Agency (EPA) for financing the construction for Wastewater Treatment Facilities. As indicated above these funds are used in perpetuity for low interest loans. In addition, the Department is given authority by the state legislature to administer several other vital state grant and loan programs.

Each year under Title VI of the Clean Water Act, Missouri prepares an Intended Use Plan (IUP), identifying the projected uses of the monies available in its Clean Water State Revolving Fund (CWSRF) that is used for construction of wastewater treatment and collection facilities. This plan serves as a basis for distributing the anticipated funds available to Missouri.

The IUP distributes Missouri's anticipated CWSRF Capitalization Grants as loans, matching state funds and repayments for the upcoming fiscal year. The IUP contains information regarding the development and management of the CWSRF priority lists and assurances mandated by federal rules. Operation and management of the CWSRF program is by the Clean Water Commission (CWC). The Clean Water State Revolving Fund (CWSRF) IUP contains the CWSRF and information regarding the Federal Infrastructure Grant Program (FSIG) and the priority lists for the State Grant and Loan Programs. A list is included of all applicants.

Planning authority granted under the Missouri Clean Water Law and the Clean Water Act involves the department in several programs including development of financing programs (see Element 8, inventory and ranking of area wide waste treatment works), a core priority. Development of the federally required IUP is the basic vehicle for the department's overall assessment and prioritization for the financing of construction treatment works and adequate sewage treatment facilities. The department also supplements or revises plans developed by municipalities. Rules require that the types of plans submitted for department review and approval take into consideration any existing state policies and plans affecting the development, use and protection for water quality. Municipal wastewater treatment disposal plans are a major element of water quality planning in the state. Municipal wastewater treatment facilities planning by county/municipals form the basis for area-wide waste treatment and water quality management planning as it exists today.

During FY 2001, for example, the state of Missouri expected to receive $37,332,405 in federal grant funds for the CWSRF program. These federal funds will be matched by state funds and distributed as outlined in the IUP. (See Element 8).

The Clean Water Commission, the Department of Natural Resources and the Environmental Improvement and Energy Resources Authority are cooperating to maximize the amount of construction that can be supported by the CWSRF together with opportunities to expand funding to include nonpoint source project controls.

State eligibility limitations for grants under EPA wastewater treatment construction grants funding programs and the state matching grant program are found in Chapter 4 of the department's water pollution control program rules. Additionally, Chapter 8 of the rules sets forth the criteria to be used as a guide in the design and construction of small sewage treatment works. Priority points are calculated for eligible projects in accordance with Chapter 4, 10 CSR 20-4.010 of the department's rules. This rule sets forth the system used by the Clean Water Commission to prioritize projects for the U.S. Environmental Protection Agency (EPA) wastewater treatment construction grants program, the state matching grants program and the state construction grants program. The Commission maintains a carryover list of unfunded projects, which retain eligibility on the Carryover Priority List.

Missouri's Clean Water State Revolving Fund Intended Use Plans for Fiscal Years 2001and 2002 and the State Grant Priority List, (these commonly referred to here as the IUP), allocate and prioritize the use of funds for several state assistance programs. In addition to delegated authority for the agency to administer the federal financing made available to states though the EPA for construction of Wastewater Treatment Facilities, the state legislature gives authority to the department to administer several state grant and loan programs. State Grant Priority Lists for the Clean Water State Revolving Fund program for both the federal leveraged and direct loan programs and state grant and loan programs can be located each year in the state's Clean Water State Revolving Fund IUP. These IUPs contain a list of all applicants for competition. The FY 2001 IUP, for instance, contains the list of applicants for competition for FY 2002. (See descriptions of loan and grant programs later in this element under Water Quality Project Funding).

List of Programs in the Department's Intended Use Plan

Federally Funded Projects in the IUP

1. Clean Water State Revolving Fund Direct Loan and Nonpoint Source Loan Program
2. Federal Special Infrastructure Grant Program

State Funded Programs in the IUP

3. State Forty Percent Grant Program
4. Hardship Grant and Loan Program

Sources of Information

- Missouri Department of Natural Resources, Water Protection and Soil Conservation Division, Water Pollution Control Program, Fiscal Years 2001and 2002, Clean Water State Revolving Fund Intended Use Plan And State Grant Priority List

Missouri Department of Natural Resources, Chapter 4- Grants rules as approved by the Clean Water Commission -

- 10 CSR 20-4.010, Construction Grants Priority System
- 10 CSR 20-4.020, State Match Program
- 10 CSR 20-4.021, State Construction Grant Program
- 10 CSR 20-4.022, Industrial Development Program
- 10 CSR 20-4.023 State Forty Percent Construction Grant Program
- 10 CSR 20-4.030, Grants for Sewer Districts
- 10CSR 20-4.040 State Revolving Fund General Assistance Regulations
- 10CSR 20-4.041 Direct Loan Program
- 10CSR 20-4.042 Leveraged Loan Program
- 10CSR 20-4.043, Hardship Grant Program
- 10CSR 20-4.049 State Match to State Revolving Fund Program
- 10CSR 20-4.050 Environmental Review
- 10CSR 20-4.060 Storm Water Assistance Regulation
- 10CSR 20-4.061 Storm Water Grant and Loan Program
- 10CSR 20-4.070 Sales Tax Exemption

Watershed Priorities: Unified Watershed Assessment (UWA)

The federal Clean Water Action Plan calls for significant funding targeted at restoration of watersheds identified as not meeting clean water and other natural resource goals. The action plan asks states to develop Watershed Restoration Action Strategies (WRAS) for those watersheds. The state's Unified Watershed Assessment (UWA) provides a roadmap of priority areas to be addressed in 1999, 2000 and in the future. The restoration schedule is based on data collected for each of Missouri's 66 hydrologic units or HUCs. Hydrologic units may be parts of watersheds. The restoration schedule can be viewed at http://www.cares.missouri.edu/mowiap under Watershed Restoration Priorities.

The current Missouri Unified Watershed Assessment is based on a single ranking of hydrological unit codes (HUCs). The Missouri UWA was completed within a short timeframe under phase I of the Missouri Watershed Inventory and Assessment Project (MOWIAP) of which the department is a member. The MOWIAP advisory committee phase II initiative is first revisiting the 8-digit Missouri UWA and then will proceed to refine the assessment to the 11- or 14-digit HUC resolution.

Working through the UWA process will result in a Multiple Attribute Prioritization of Missouri Watersheds based on sound water quality variables. Missouri UWA work is the product of a grant between EPA and the Center for Agricultural, Resources and Environmental Systems (CARES). The Water Pollution Control Program is an active participant in the Missouri UWA process, which has many participants representing several Missouri organizational programs.

The watershed protection approach for the state being refined at this time is a framework for integrating traditional water quality management activities that address nonpoint as well as point source pollution and the implementation of restoration strategies. Missouri along with at least 40

other states has EPA approval to administer their National Pollutant Discharge Elimination System program addressing point sources (see Element 1). The department is currently developing Total Maximum Daily Load Plans to address nonpoint source as well as point source pollution (see Element 3).

Missouri has historically used a watershed ranking to prioritize watershed projects. Pursuant to the Clean Water Action Plan, each state has been required to develop a UWA based on an 8-digit hydrological classification unit. Of Missouri's 66 8-digit hydrological units, 56 are identified as Category I Watersheds. These 56 were evaluated and prioritized. Five watersheds were identified as priorities for restoration work in 1999 and an additional five were identified for 2000.

The use of the 8-digit hydrological unit codes poses significant challenges if using the Unified Watershed Assessment as a prioritization tool for nonpoint source activities. For this reason Missouri has chosen to use the 303(d) listing as the primary prioritization tool and will use the assessment as a secondary tool as appropriate. It is expected that the watershed assessment will be refined in the future at which time it may more appropriately be used in this prioritization process.

The watershed protection approach of the department is a place-based strategy that integrates water quality activities within hydrologically defined drainage basins or watersheds. Meetings for the Unified Watershed Assessment Committee are publicly noticed and presentations have been coordinated with the public meetings of the Water Quality Coordinating Committee and other agencies with period forums such as the National Resource Conservation Services, US Department of Agriculture. Those interested in finding out more about the work for Unified Watershed Assessment may contact advisory and technical committee members at http://www.cares.missouri.edu/mowiap, concerning the Missouri Watershed Inventory and Assessment Project (M0WIAP), Phase II.

Please see the watershed map in Appendix C.

Nonpoint Source Management Planning (NPSMP)

With the enactment of Section 319 of the Clean Water Act of 1987, federal financial assistance was authorized for the implementation of state Nonpoint Source Management Planning programs. Since 1996, state nonpoint source (NPS) management planning has increased as a direct result of the U.S. Environmental Protection Agency (EPA) providing $470 million in grants to states to implement NPS programs.

Missouri's Nonpoint Source Management Plan was prepared by the Missouri Department of Natural Resources in cooperation with partner agencies and Missouri citizens in response to the requirements of Section 319 of the federal Clean Water Act of 1987 (the Act). The EPA first approved the plan in 1989. A comprehensive revision to that plan was approved by the Clean Water Commission in June 1999 and approved by EPA in June 2000.

The department believes that the best solutions for the nonpoint-source water-quality problems are those that involve broad and active local support and participation. Citizens across Missouri

are proceeding with watershed enhancement projects funded in part by federal grants. Local citizens and government agencies continue to join in partnership to protect or restore water quality before impaired waters are added to the 303(d) impaired waters list or removed from the 303(d) list. A properly prepared, watershed-based (one based on water bodies in a defined geographical area) approach to water quality management, acceptable both for point and nonpoint source implementation strategy includes Missouri's Total Maximum Daily Load (TMDL) program. A TMDL program is a program of special, intensive and focused strategies for reducing pollution and bringing 303(d) listed waters back into compliance with Water Quality Standards for both point and nonpoint sources (see Element 3).

Acceptable point source and nonpoint source water quality planning needs adequate funding and quality monitoring to implement water quality protection on the watershed level. Also important is the commitment and cooperation of local landowners and managers. The goal of nonpoint source planning is to achieve Water Quality Standards at the earliest date possible. Watershed-scale plans to manage our natural water resources may take various forms in order to respond to local situations. Projects may be prioritized according to effectiveness in reducing pollution regardless of the watershed. Conversely, emphasis may be placed on impaired or threatened watersheds.

Nonpoint Source Management Controls

Control of nonpoint water pollution sources, such as runoff from farms, cities, mining areas and construction sites, is still essentially a voluntary program. Regulations are in place to prevent leakage from underground storage tanks and for the secondary containment of bulk agricultural chemical storage sites. Commercial and many other sand and gravel mining operations require a general permit for storm water. Smaller operations have been provided with guidelines for best management practices.

Control of many nonpoint sources are addressed by Missouri's nonpoint source management program. To plan and implement watershed projects that use nonpoint source control and protection practices and frequently monitor water quality, the Water Pollution Control Program works with federal, state and local governments, universities, private groups, and individual landowners.

Missouri Nonpoint Source Management and Restoration – Section 319

Missouri's Nonpoint Source Management Plan (NPSMP) was initially prepared by the Missouri Department of Natural Resources, in cooperation with partner agencies and Missouri citizens. The rapid pace of technological improvements requires continuous development of nonpoint source management planning. Missouri periodically reviews and evaluates its nonpoint source management planning, revising it at least every five years.

The NPSMP incorporates environmental measures that include assessing the trend in the number of impaired lake acres and stream miles listed on the most recently approved 303(d) list.

The EPA requires that states outline the nonpoint source pollution categories and subcategories they must address. Missouri's priority nonpoint sources follow.

- **Agricultural nonpoint sources:** Agriculture is one of Missouri's largest industries. Farms make up 28.5 million acres or 65 percent of the state's land. Sixteen million acres of that land is either harvested or pastured. The primary pollutants from agricultural land include sediment, fertilizer, pesticides and animal waste. The potential for nonpoint source pollution is high from agricultural operations, as determined by category of pollutant.
- **Urban nonpoint sources:** Urban nonpoint sources are a major concern as urban areas continue to expand at increasing rates. Urban nonpoint sources have had a significant negative influence on water quality. Sediment contributes to severe water quality degradation and is caused by the modification of stream flows and the loss of aquatic habitat.
- **Acid mine drainage from abandoned coal mined lands:** Presently operating mines are regulated, and contaminants are generally controlled. Abandoned mined lands create local water pollution problems and episodic impacts to Missouri's water bodies. The primary contaminants are acidity and sulfate. The scale of many sites is too large to address through nonpoint source funding; though smaller, treatable sites may be considered.

In addition to priority categories, the state is required to identify priority waters as follows:
- those on the 303(d) list for waters impaired by nonpoint sources,
- those designated as outstanding national or state resource waters, and
- waters not degraded enough to be on the 303(d) list but are in need of protection to prevent their future listing.

Funding priorities mirror the above list but pursue a broader program when possible in order to provide a balanced approach to nonpoint source pollution prevention. (See additional comments on sources of funding for point and nonpoint source pollution controls in this element.)

Section 319
Planning activities under Section 319 of the Clean Water Act have assumed new direction and significant federal assistance for the implementation of the state's nonpoint source (NPS) authorized programs.

Missouri's expectations for management of water quality are based on the state's Water Quality Standards. In 1996, a committee of state and EPA representatives, called the National Nonpoint Source Working group, developed a list of what is needed for nonpoint source management planning. The workgroup was sponsored by the Association of State and Interstate Water Pollution Control Agencies and included a participant from Missouri. Missouri's Nonpoint Source Management Plan designated the categories and water bodies of highest priority in the state.

Restoration
The two focus areas for restoration activities in nonpoint source management planning include the development of voluntary water quality management plans and Total Maximum Daily Load (TMDL) plans for point and nonpoint sources and the implementation plans for watershed restoration projects. To achieve restoration and protection, Missouri's Nonpoint Source Management Plan supports implementation of voluntary water quality management plans and/or TMDLs. Assembling a framework for a voluntary water quality management plan can be approved within the TMDL process and be included within the restoration plan. The voluntary

water quality management plan and the TMDL plans inform citizens of their watershed's status and provide for public participation by providing incentives for voluntary action and the tools to allow locally led groups to be effective.

The Clean Water Act directs states to focus substantial effort on the restoration of impaired waters. Funding pursuant to section 319 is required to be used for restoration projects. Missouri considers this requirement in prioritizing its nonpoint source grant activities.

Nonpoint Source Assessment

Large diffuse nonpoint sources are difficult to quantify. Missouri has relied heavily on fish distribution, which has shown the loss or decline in fish populations for certain species. This data, and studies in the technical literature on the impacts of channelization and other physical disturbances, have been the foundation of the assessment of agricultural nonpoint source pollution which affects virtually all streams in the glaciated plains, Osage plains and Bootheel regions of the state.

The assessment program for nonpoint source pollution includes many activities and efforts on the part of agencies and individuals working with the Water Pollution Control Program's overall monitoring activities discussed directly below under Monitoring and Assessment.

Sources of Information

Nonpoint Source Management Plan, revised in 2000, is a comprehensive plan.
For information on nonpoint source water pollution in Missouri, call the Technical Assistance Program at 1-800-361-4827 or visit the department's Web site at http://www.dnr.state.mo.us to view the NPSMP, a 465-page document approved by EPA in June 2000. The NPSMP is public noticed annually so that the public may comment on any proposed revisions.

Missouri's Nonpoint Source Management Plan may be accessed at http://www.dnr.state.mo.us/deq/wpcp/.

Monitoring and Assessment: The Basis for the Planning of Both Point and Nonpoint Source Protective Measures

Multiple purposes for water quality monitoring in the planning section of the program as follows:

- to characterize background or reference water quality conditions,
- to monitor daily flow and seasonal water quality variations,
- to characterize aquatic biological communities and habitats and to distinguish the impact of water chemistry and habitat quality,
- to check for compliance with Water Quality Standards and wastewater permit limits,
- to develop Total Maximum Daily Loads (TMDLs) to direct pollution control activities,
- to support development of strategies to return impaired waters to compliance with water quality standard,
- to characterize the impact of specific nonpoint or point sources, and
- to assess water quality trends.

The department coordinates its monitoring activities to avoid overlap with agencies and to receive input on study design. Data from other sources is used for meeting the same objectives

as department-sponsored monitoring. Water quality monitoring data within the department has focused on the chemical characterization of water quality in streams both free of and those subject to point source wastewater discharges. Monitoring has kept pace with critical point source assessment needs and in characterizing regional water quality. Increasing numbers of CAFOs and increasing water quality and habitat concerns due to urban sprawl are issues not adequately addressed by our current monitoring program.

Missouri's Nonpoint Source Management Plan (NPSMP) contains the state's proposed Water Quality Monitoring Program located in Appendix K of the plan and is available on the department's web. Nonpoint Source Assessment, in Section V of the Nonpoint Source Management Plan was recently revised. The Clean Water Commission approves revisions to the NPSMP on an annual basis. Revisions are then forwarded to EPA.

Plans for Comprehensive Assessment: Large Rivers

The objective for monitoring and assessment here is to maintain fixed station water quality monitoring dedicated to long-term chemical monitoring of large rivers. Monitoring should be 6 to 12 times annually for a long list of conventional contaminants and heavy metals. The Missouri Department of Natural Resources, through a cooperative agreement with the U.S. Geological Survey, now monitors 31 such sites.

Sediment Monitoring of Large Rivers

The objective is to maintain a minimum of 15 fixed sites where sediments will be monitored at least once every five years. Additional sites (10) are monitored for suspected sediment pollution problems. As land-use patterns change, some unmonitored, larger rivers may become unlike nearby monitored ones. For example, a particular basin may receive high volumes of CAFO waste while the nearby monitored basin does not. In this case the river with changing land uses will need to be added to the network.

Monitoring the Mississippi and Missouri Rivers

These rivers have unique aquatic ecosystems with specialized habitats and fauna. Due to their size, depth and velocity, they are difficult to monitor. The Long Term Monitoring Program on the Upper Mississippi River examines the physical, chemical and biological characteristics of the water with assistance from the U.S. Geological Survey. The department reviews water quality data on these two rivers from other state, federal and municipal sources.

Intensive Surveys

This type of survey attempts to address a specific question on a specific water body or group of water bodies. Examples would include:

- waste-load allocation studies, which result in determining acceptable effluent loads from point source discharges
- Total Maximum Daily Load studies, which determine acceptable contaminant loads from the entire watershed
- less intensive chemical studies of point or discrete nonpoint source discharges, for monitoring in support of the Clean Water Act's Section 319 watershed projects
- other studies relating to effluent quality, surface or groundwater quality or hydrology, or studies of the aquatic biota

Surveys are used to characterize the water quality impacts from a specific pollutant source. Site selection is based on previous water quality studies, effluent sampling and/or National Pollutant Discharge Elimination System permit applications. Sampling design includes use of multiple sampling stations downstream and upstream (as appropriate) of the source. If contaminants of concern have significant seasonal or daily variation, these are accounted for in the sampling design. The department conducts or contracts four to six special studies annually. Beginning in the year 2000 staff increases in the water pollution control program should allow for 10 annual studies.

Lakes

The Lake Monitoring Network covers about 110 Missouri lakes monitored quarterly for nutrients, chlorophyll, Secchi depth and solids by the University of Missouri under a cooperative program with the Department of Natural Resources. This project has been ongoing for several years and characterizes the trophic states of these lakes. The project has laid the foundation for a characterization of the relationship of nutrients, mineral solids and algae productivity in mid-western reservoirs.

Drinking Water Supply Reservoirs are monitored by the department using raw (untreated) water sampling at 31 public drinking water sites. Samples are collected four (4) times a year and analyzed for common herbicides.

Lakes of Missouri Volunteer Monitoring Program

Approximately 70 volunteers collect water samples and make field observations for the Lakes of Missouri Volunteer Monitoring Program. Twenty-five reservoirs in Missouri were monitored under this program since 1977.

This program is a cooperative effort between the Department of Natural Resources and the University of Missouri. Volunteers monitor approximately 16 lakes, including Lake Taneycomo, Table Rock Lake, Lake of the Ozarks and several lakes in the Kansas City area. The University, as part of a long-term study on Midwestern reservoir limnology, uses data from this program. Secchi depth, chlorophyll and nutrients are all analyzed. The Department of Natural Resources and the University of Missouri are working to expand the present lake volunteer program.

Special Studies

The department cooperates with other agencies in performing special water quality studies. In 1998, a multi-agency task force, including the Department of Natural Resources, the Missouri Conservation Department, the U.S. Environmental Protection Agency, the U.S. Geological Survey, the U.S. Forest Service, the U.S. Natural Resource and Conservation Service and the University of Missouri, Columbia, convened to:

1) outline a statewide aquatic resources monitoring plan,
2) define partnership rules in this monitoring plan, and
3) discuss the kind of research needed to initiate in 2001, a cooperative state-wide aquatic invertebrate and fish monitoring program by the Missouri Department of Conservation and the Department of Natural Resources.

The department tracks the monitoring efforts of U.S. Park Service, the U.S. Forest Service, several of the state's larger cities, the states of Arkansas, Kansas, Iowa and Illinois and graduate level research conducted at universities within Missouri. The department uses monitoring data acquired by wastewater dischargers to condition the discharge permits issued by the department. The department began using data collected by volunteers that have passed Quality Assurance/Quality Control, (QA/QC) tests in 1995.

Projects in this category also include monitoring of Section 319, waste-load allocation studies and use attainability analysis and other watershed projects, U.S. Geological Survey monitoring and National Water Quality Assessment program studies and the U.S. Department of Agriculture Management Systems Evaluation Project.

Aquatic Biological Community Data

William Pflieger's *Fishes of Missouri* summarizes fish distribution in the state from records from 1835 through 1999. The Missouri Department of Natural Resources routinely monitors 50 sites for biological conditions, and other agencies conduct similar activities. Unpublished data is available from Missouri Department of Conservation, Department of Natural Resources studies and the EPA. The state Nonpoint Source Management Plan is available on the department's Web site for the Proposed Water Quality Monitoring Program for Missouri, including the components for a comprehensive water monitoring plan for both quality and quantity of surface and ground waters as well as other nonpoint source efforts.

Wetlands

The department does not conduct routine wetland monitoring. Some wetland monitoring may be done as part of a watershed assessment, an environmental impact statement process or in response to a complaint. The loss of wetlands is tracked through the 404 Permit review process. (See Element 1)

Groundwater

Groundwater data is obtained from the department's Public Drinking Water Program and the Missouri Department of Health State Laboratory. Data is generated from analysis performed on private wells and public drinking water supplies that use well water as their source water. Data is collected and reviewed by the Hazardous Waste Program and by the Solid Waste Program, where data is collected from the monitored wells at permitted landfills.

Area-wide Trends in Water Quality

Large sample sizes are needed to detect all but the most obvious trends. Missouri has studied trends since 1979 at 13 sites on larger rivers. The state also has studied water chemistry from 17 streams since 1970 and water chemistry on the Missouri and Mississippi Rivers since 1964. Levels of nutrients, chlorophyll and secchi depth in more than 100 Missouri lakes were analyzed for trends in 2000.

Aquatic Macro-Invertebrate Monitoring Program: Biological Monitoring Special Study

The first major product of the 1998 task force (see Special Studies above) was an agreement to initiate a cooperative statewide aquatic invertebrate and fish-monitoring program by the Missouri departments of Conservation and Natural Resources in the year 2001.

A macro-invertebrate monitoring network site is planned for 2002 that will evaluate streams against numeric criteria for invertebrate communities in Missouri's Water Quality Standards. Criteria will be based on reference sites within that eco-region. A stream must be sampled at the same time as the reference stream. Biological criteria will be implemented within the state's Water Quality Standards.

The department is developing reference aquatic macro-invertebrate communities in Missouri's wadeable streams. The development of biocriteria for invertebrates has involved the identification of 45 reference streams divided among Missouri's three aquatic ecoregions. Intensive sampling has been conducted to quantify temporal and spatial biological variation in reference streams within ecoregions. Sampling of chemically and physically impaired streams has been conducted to test sensitivity of various community metrics to differences in stream quality. This effort will sample fish and benthic macro-invertebrates in at least 50 stream locations annually. Some water chemistry sampling and a physical habitat assessment will also be done at each site. Sampling will be done on a three-year cycle. Two-thirds of the work done in each cycle will include monitoring a combination of fixed stream sites and sites of special interest (those suspected of being impaired by point or nonpoint stressors, such as streams on the state 303(d) list). The remaining third of this sampling effort in each cycle will consist of randomly selected stream sites that should assist in making probability-based statements about the biological condition of Missouri streams generally.

Wadeable Streams (Small Rivers and Creeks)

A protocol for rapid stream assessment, called Visual/Qualitative Aquatic Invertebrate Rapid Stream Assessment, was developed and implemented by the department in 1982. The goal is to assess the impact of all municipal wastewater discharges, limestone quarries, clay pits and landfills at least once every five years.

Fixed Station Monitoring Network

Indicators of regional nonpoint sources for chemical monitoring involve 75 percent of the monitoring stations. Covering all major physiographic regions of the state, the monitoring stations provide information on storm-water runoff and subsurface flow during base flow conditions for six large springs. This network includes data generated by other agencies for a total of about 70 sites used to collect nonpoint source data. More than 100 drinking water reservoirs are sampled quarterly.

Fixed Station Fish Tissue Network

The Department of Natural Resources and the U.S. Environmental Protection Agency (EPA) jointly maintain a monitoring network of 15 stations monitoring fish tissue. Half of the sites are

sampled annually. The Missouri Department of Conservation also collects and analyzes many samples. Fish tissue monitoring in Missouri has documented declines in chlorinated hydrocarbon insecticides in fish over time and increasing levels of mercury.

The purpose of fish tissue sampling is to measure the levels of bio-accumulative toxicants in fish. Sites are evaluated annually by taking fish via electroshocking. Ideally a sample is composed of five whole carp, Cyprinis carpio, of equal size. Sites are sampled once every two years, and samples are analyzed for several chlorinated hydrocarbon insecticides, PCBs, lead, cadmium, mercury and fat content.

Volunteer Monitoring

The Missouri Volunteer Water Quality Monitoring Program, affiliated with the Missouri Stream Team Program, monitors the water quality of streams throughout Missouri. By the end of 1999, this program had provided initial training, equipment and supplies to 1,910 volunteers, provided secondary training and Quality Assurance/Quality Control ratings for 270 volunteers and established a database for all data reported by the volunteers. A rating above Level II allows the data they provide department to be used in the water quality assessment database. During the period through 1999, higher rated volunteers submitted at least three sets of aquatic invertebrate data at 69 stream sites and at least three sets of chemical data on 105 stream sites.

Volunteer Water Quality Monitoring Program

Citizen monitoring groups have submitted over 2,000 sets of physical, chemical and/or biological data for monitoring sites throughout the state. Volunteer data is used as supplemental information by state and local decision-makers to determine current stream conditions and to identify potential problem trends in water quality. Volunteers send data for over 200 stream sites to the Department of Natural Resources.

Volunteers do chemical monitoring and semi-quantitative macro-invertebrate benthic (organisms located at the bottom of the water) sampling. Volunteers with acceptable quality assurance training monitor and report to the department on 43 stream sites regularly. The number of streams monitored increases with the expansion of this monitoring program.

Toxics Monitoring

Monitoring of toxics is not a separate part of the monitoring program. The fixed station network and many of the intensive studies include monitoring for toxic chemicals. In addition, major municipal and industrial dischargers must monitor for toxicity in their effluents as a condition of their National Pollutant Discharge Elimination System permits.

Coordination of the Monitoring Effort

It is estimated that there are approximately 56,000 miles of rivers and streams in the state. The water quality monitoring network is designed to collect data that will meet water quality management and planning needs. Rivers commonly have many permitted discharges along their courses. Inadequate or unavailable water data can make it difficult to determine the impact of any given discharge on the receiving water body. To maximize efficiency, the department routinely coordinates its monitoring activities to avoid overlap with other agencies and provides and receives interagency input on monitoring study design.

The agencies most often involved are the U.S. Geological Survey, the U.S. Army Corps of Engineers, the EPA, the Missouri Department of Conservation, the USDA/Agricultural Research Service and the Missouri Department of Health. However, the department also tracks the monitoring efforts of the National Park Service, the U.S. Forest Service, several of the state's larger cities, Arkansas, Kansas, Iowa and Illinois and graduate level research conducted at universities within Missouri. The department also uses monitoring data acquired by wastewater dischargers as a condition of discharge permits issued by the department. The department began using data collected by volunteers that have passed quality assurance and control tests in 1995.

Historically, Missouri's water quality monitoring program has been adequate to meet the needs of management of point sources. It is difficult to increase the scope of the current monitoring efforts to accommodate and or adequately characterize the nature, extent or severity of many nonpoint source pollution problems. The heart of this concern lies not in the monitoring efforts that result in an increase for 2000 and 2001 but in the present limitations of stream limnology and the difficulty encountered when linking specific watershed land use and management practices to in-stream problems. The status of the department's knowledge in the nonpoint source areas will be expanded through the cooperation of the public in attempting to identify and cope with nonpoint source pollution.

Areas of Research in Nonpoint Source Pollution

Areas of research that may increase the understanding of stream processes and nonpoint source pollution are continually under review by program staff. Research includes the relationships of nutrients, algae and suspended sediments, stream biota and how they are affected by physical changes in stream channel and riparian zones. Research is also done on the development of a statewide fixed network of aquatic macro-invertebrate monitoring sites.

Missouri's nonpoint source pollution assessment involves several issues. Localized nonpoint sources, such as drainage from abandoned mine lands, can be accurately characterized by water chemistry studies. Frequency and concentration of synthetic organic chemicals have been well documented by chemical monitoring.

Public Involvement

The process for soliciting and considering "all readily available data" as required under the Clean Water Act is well documented and the process is open to the public. In 1999, for instance, a series of meetings were held in each of the Department of Natural Resources regions (Southwest, Southeast, Northeast, Central, St. Louis and Kansas City Regional Offices) requesting public input on impaired waters. These meetings are advertised via the department's Web site and through notice in local newspapers.

Assessment Methodology

Water quality is judged by its conformance to Missouri's Water Quality Standards. Standards were first implemented for all Missouri streams and a few large lakes in 1970 and are revised every three years. These standards now list over 21,000 miles of classified streams and 415 significant public lakes representing 292,000 surface acres of water and the uses for which these

waters are protected. These standards also list the maximum allowable concentrations of chemicals and bacteria in these waters. (See Element 6, Water Quality Standards). Methods for assessing compliance are found in the following charts.

Below are tables that demonstrate the program's methods for assessing compliance with Water Quality Standards including the data types.

Methods for Assessing Compliance with Water Quality Standards

BENEFICIAL USES	DATA TYPE	DATA QUALITY CODE*	COMPLIANCE WITH WATER QUALITY STANDARDS
Overall use protection	No data--evaluated based on similar land use/ geology as stream with water quality data.		Given same rating as monitored stream with same land use and geology.
Protection of Aquatic Life	Chemical (toxics)	1-2	Full: No more than 1 exceedance of acute criterion in 3 years; less than 10% of all samples exceed chronic criterion. Partial: More than 1 exceedance of acute criterion in 3 years; less than 10% of all samples exceed chronic criterion. Non-Attainment: More than 10% of all samples exceed chronic criterion.
	Chemical (conventional)	1-2	Full: Less than 10% of all samples exceed criterion. Partial: 10-25% of all samples exceed criterion. Non-Attainment: More than 25% of all samples exceed criterion.
	Biological	3	Full: Fauna very similar to regional reference streams. Partial: Diversity or number of intolerant taxa slightly to moderately less than reference streams. Non-Attainment: Diversity or number of intolerant taxa much less than reference stream.
	Toxicity testing of effluent	2	Full: No statistically significant mortality in either of two tests species at the AEC*** or the AEC must be less than

BENEFICIAL USES	DATA TYPE	DATA QUALITY CODE*	COMPLIANCE WITH WATER QUALITY STANDARDS
			30% of the LC_{50}** for both test species. Non-Attainment: Conditions for full attainment not met.
	Toxicity testing of streams or lakes	3	Full: No statistically significant deviation from controls in chronic test endpoints in at least two representative species. Non-Attainment: Statistically significant mortality in at least one of two representative test species.
Fish Consump-tion	Chemicals (water) Chemicals (tissue)	1-2	Full: Water quality criteria not exceeded as a long-term average; fish consumption advisories allow typical or average fish consumption rates for all commonly eaten species. Partial: Fish consumption advisories allow less than typical or average consumption rate for at least one commonly eaten species. Non-Attainment: Water quality criteria exceeded as long-term average or consumption banned for at least one commonly eaten species.
Drinking Water Supply	Physical, chemical (nutrients)	1-2	Full: Very little loss of lake volume due to sedimentation, low levels of nutrients, no history of taste or odor problems due to algae. Threatened: Rate of sedimentation moderate and no taste and odor problems known but nutrient or algae levels similar to lakes with taste and odor problems. Partial: Water supply may be inadequate in dry years due to loss of volume to sedimentation or supply has infrequent taste and odor problems. Non-Attainment: Water supply has chronic water shortage due to loss of storage volume to sedimentation or frequent taste and odor problems or supply causes infrequent gastrointestinal problems in users.

BENEFICIAL USES	DATA TYPE	DATA QUALITY CODE*	COMPLIANCE WITH WATER QUALITY STANDARDS
	Chemical (toxics, raw water)	1-2	Full: Mean values do not exceed criterion or Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs). Threatened: Chemical use patterns in watershed are similar to watersheds with non-attainment. Non-Attainment: One or more contaminants have mean values in excess of water quality criteria or SDWA MCLs.
	Chemical (Iron, Manganese, Total Dissolved Solids, Raw Water)	1-2	Full: Mean values do not exceed criterion. Threatened: Mean values do not exceed criterion but time trends suggest mean may be exceeded in future. Non-Attainment: Mean values exceed criterion.
	Chemical (toxics, finished water)	1-2	Full: No MCLs or Water Quality Standards criteria exceeded or significant taste and odor problems using only convention treatment (sedimentation-disinfection). Threatened: Chemical use patterns in watershed are similar to watersheds not in full attainment. Partial: Additional treatment needed to meet MCLs or Water Quality Standards criterion. Non-Attainment: At least one contaminant has annual average exceeding MCL or Water Quality Standards criterion or supply has been closed during the past 2 years due to contamination of raw water entering the plant. NOTE: water quality problems caused by the drinking water treatment process such as the formation of Trihalomehtanes (THMs) are not included.
Whole-Body-Contact Recreation	Fecal Coliform count	1-2	Full: Water Quality Standards not exceeded as a geometric mean for samples collected during the recreation season and at times not influenced by storm water

BENEFICIAL USES	DATA TYPE	DATA QUALITY CODE*	COMPLIANCE WITH WATER QUALITY STANDARDS
			flows. Non-Attainment: Geometric mean does exceed Water Quality Standard criterion during recreation season at times not influenced by storm water flows.
Irrigation, Livestock and Wildlife Water	Chemical (boron, cobalt)	1-2	Full: Mean value does not exceed water quality criteria. Non-Attainment: Mean value does exceed water quality criteria.

* Data quality codes have been established by the U.S. Environmental Protection Agency to rate the quality and quantity of data from a specific source. Level one data is the lowest level of useable data and includes infrequent chemical monitoring or qualitative biological monitoring. Level Two data would include intensive water chemistry studies, long-term water chemistry monitoring sites and fish tissue analysis. Levels Three and Four are for detailed biological studies of fish, aquatic invertebrates and toxicity testing of waters.

** LC_{50} The concentration of a contaminant that kills 50 percent of test organisms.

*** AEC = Acceptable Effluent Concentration. This is the percentage of effluent in a solution of effluent at the effluent design (max.) Flow mixed with 2.5% of the $7Q_{10}$ low flow of the receiving stream. This would simulate the in-stream toxicity potential of the discharge during dry weather.

Enforcement

An essential component of the department's Water Pollution Control Program is found in the enforcement actions that are taken to enforce compliance with the program's applicable laws, regulations and permit conditions and to deter noncompliance. The primary purpose of the enforcement activity in the program is to resolve violations of the Missouri Clean Water Act to return the facility to compliance. Subordinate goals are to deter future noncompliance by the responsible party. Before enforcement action is taken a violation must exist. Enforcement does not result from failure of the regulatory authority but from failure of the regulated party. Enforcement is a useful tool that complements the program's ability to deal with the regulated community.

Regardless of the nature, size or class of the facility prompt, consistent and effective enforcement action will be taken when violations are brought to the department's attention.

Enforcement Procedures

Missouri Clean Water Law states that "… if in the opinion of the executive secretary, the investigation discloses that a violation does exist, he may, by conference, conciliation or persuasion, endeavor to eliminate the violation. In the case of the failure by conference, conciliation or persuasion to correct or remedy any claimed violation, or as required to immediately and effectively halt or eliminate any imminent or substantial endangerment to the health or welfare of persons resulting from the discharge of pollutants, the executive secretary shall order an abatement… ."

After a violation has been noted an Enforcement Action Request is made immediately in emergency conditions where irreparable harm or endangerment to the health or welfare of persons is imminent. In other situations, the regional offices and the program will attempt to remedy the violation through the process of Conference & Conciliation Process before proceeding to seek referral for enforcement action (See Element 1).

Regional and Local Satellite Offices

Regional and local satellite offices respond to the public and investigate alleged violations of the Missouri Clean Water Law. The regional and local offices are required to submit complaints and standard inspection reports to the Water Pollution Control Program and letters to appropriate parties. Standard complaint investigation reports are completed per the Inspection and Maintenance Manual. Copies of complaints and investigative reports and Water Quality Information System forms are sent in accordance with the manual. Any issues not covered by the Missouri Clean Water Law are referred to the appropriate local, state or federal agency.

Inspections

- Complaints involving a Class I Concentrated Animal Feeding Operation (CAFO) may include a formal inspection of the entire facility or a site investigation of the portion or activity of the Class I facility that is involved.
- Complaint investigation involving a Class II or unclassified CAFO/AFO includes an inspection of the CAFO/AFO.
- Inspections are conducted at all Missouri Department of Transportation construction sites with active permits and projects. The Water Pollution Control Program provides an ongoing inventory of active sites to the regional offices. The program is provided with geographic coordinates during inspections. Complaint data are entered into the production tracking system.
- Inspections are conducted at each permitted facility where the discharge of contaminants has resulted in placement of the water body on the 303(d) list of impaired waters. The Water Pollution Control Program supplies the regional offices with a list of such facilities. Current performance status is assessed in anticipation of the development of the Total Maximum Daily Load (TMDL). Appropriate effluent limits and Total Maximum Daily Loads are incorporated into permits that are re-opened for review and or re-issuance.
- The Quality Assurance Control project ensures consistency in inspections of Class IA and IB CAFOs. The quality assurance project involves a joint inspection effort. On a continuing basis, Water Pollution Control Program staff, regional staff with jurisdiction over the inspected facility, and staff from one other region participate in at least one joint inspection in each of the regions.
- Water quality data used in determining 303(d) listings and development of TMDLs is verified.
- Regional offices coordinate with other resource professionals and environmental volunteers to facilitate data collection and verification and interaction with stakeholders in TMDL watersheds to assist with implementation of TMDLs.
- A primary goal is the inspection of all major industrial facilities and major municipals approximately once every five years. Any facilities with known compliance deficiencies or discharges to sensitive water bodies may be inspected more frequently.

- Inspections include reviews of the publicly operated treatment works sludge-handling and disposal procedures.
- Inspections are conducted during construction and after completion of construction for EPA grant projects.
- Two-year operation and maintenance evaluations are required on all major pump stations and mechanical facilities funded by federal construction grants. Technical Assistance Program operations staff provide assistance to relieve backlogs or maintain schedules.
- All animal waste treatment facilities funded or partially funded with State Revolving Fund monies must have a final inspection within a year of construction completion.
- Site surveys are conducted for all treatment facilities, major sewage lift stations and major interceptor sewer projects.
- Inspections of approximately 20 percent of all minor facilities (other than CAFOs) and agricultural chemical facilities are made annually.
- Complaint investigations for storm water situations and facilities initiate conference, conciliation and persuasion where necessary.

Enforcement action is taken to compel compliance with the Missouri Clean Water Law and regulations or permit conditions. The action is initiated with the issuance of a Notice of Violation. Upon completion of the appropriate conference, conciliation and persuasion procedures, submittal of an Enforcement Action Request to the Water Pollution Control Program is usually appropriate.

Please see the locations and contacts of the department's regional and local offices in Appendix G.

Engineering

The Engineering Section of the Water Pollution Control Program provides a range of assistance to the public in two major areas. These areas are technical assistance and technical review.

Technical assistance is available to grant and loan recipients, consultants, Animal Feeding Operations, Concentrated Animal Feeding Operations (CAFOs), regional offices and other parties to ensure the proper planning, design, construction and operation of wastewater treatment facilities. Industries request technical and on-site assistance related to existing or potential water pollution situations.

A technical review is provided for the construction of new facilities or the upgrade of existing facilities in order to maintain compliance with state statutes, regulations and accepted engineering practices.

Technical reviews are provided for the construction of new facilities or the upgrade of existing facilities in order to maintain compliance with state statutes, regulations and accepted engineering practices as outlined below.

- Review of engineering documents for Wastewater Collection and Treatment Systems receiving financial assistance from the department
- Review of engineering documents for Animal Waste Management Projects

- Development and interpretation of design rules for Water Pollution Control Projects, from small subdivisions to large metro areas

Wastewater collection and treatment facility planning is the responsibility of continuing authorities for the geographic area for which they have responsibility. Customarily, consulting engineers, under contract with the continuing authority, develop the actual plans. Coordination with local officials, including officials of other continuing authorities, the public and with the department's regional offices and central office staff is a component of the planning process, especially area-wide planning. Missouri Clean Water Commission Rules establish minimum criteria for the planning process and the design of wastewater facilities. The technical criteria are found in the department's rules. Primarily, these Design Guides follow the Recommended Standards for Wastewater Facilities established by the Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers (GLUMRB).

GLUMRB is a committee of 10 states and one Canadian province that share the common waters of the Great Lakes and the Mississippi River. The committee was established in 1947 to develop uniform standards for sewage works. This committee was assigned the responsibility of reviewing existing standards for sewage works, to investigate the possibility of preparing joint standards to be adopted by the states represented and to report its findings to the Board. The state of Missouri is a member GLUMRB.

Geographical Information System

Water Pollution Control Program has made great strides in creating a well-structured and integrated database that's goal is to improve the efficiency of decision-making in the water pollution control effort through wider application of geographically based information. The geographic information system (GIS), a powerful computer software, offers an environment that can integrate various databases and geographic locations and make it possible to summarize relationships between specific pollutant loads and in-stream water quality. These relationships can come in the form of electronic and hardcopy maps and related tables and diagrams or reports. The GIS coverage exists for both municipal and non-municipal wastewater dischargers into Missouri streams and lakes.

Using GIS allows an investigation of environmental relationships. GIS aids in understanding and solving real water problems. By attaching data to coordinates on a map, patterns, trends and ideas may be identified, helping to research pollution and its effects within a community.

Water Pollution Control Program has also taken advantage of improvements in computer technology that makes it possible to incorporate mathematical models into GIS. Incorporations of modeling components into GIS allow users to examine impacts of pollution loading and characterize the overall conditions of specific watersheds at the local, state or regional level. Hence, GIS is being applied to water quality modeling in the development of Total Maximum Daily Loads (TMDLs). The TMDL process provides for more stringent water quality-based controls to achieve state Water Quality Standards.

Work has been recently completed to link facility discharge information and classified water body segment data. A direct connection has been established to link discharge facilities to their

respective receiving water body segments. The GIS environment has been utilized to integrate various data sets in Water Quality Information Systems and map locations.

Pilot projects developed during basin planning (described above) will be augmented using GIS software. At this time, GIS staff have updated the first pilot project for White River Basin to show the point source facilities within particular stream segments throughout this basin that have the potential to pollute. After logging on to the department's Web site for water anyone with access to the **I**nternet may geographically view any stream segment and identify the permitted facility operations within those particular stream locations.

Database linkages will eventually facilitate the creation of a relational database based on 14-digit Hydrological Unit Code (HUC) numbers, water body segment numbers, NPDES facility identification numbers and the U.S. Environmental Protection Agency's (EPA) River Reach File, version 3 (RF3). The new system will create a structured database that will have query capabilities and will enhance information processing and retrieval for environmental decision-making.

Through an arrangement with the data center and the department's Management Information Systems we can now access data center files directly though Microsoft Access. This is a direct link and will help in feeding divisional databases. An Access report can now be done directly out of Water Quality Information Systems.

Water Quality Information System

The Water Quality Information System (WQIS) is the Water Pollution Control Program's main database for managing all water-related data including permit and permit-related information. It was the department's first interactive database, and it is the first department database that interacted with a federal database. It preceded a federal policy to create a "Memo of Understanding" for databases and networks among states and the U.S. Environmental Protection Agency National Computer Center in North Carolina.

The design document and systems analysis for the WQIS effort began in the 1980's. The database was initially online in 1984 and formally ready in 1987 for data entry and inquiry. Using "Cool:gen" application programs, the 1998 database was reconfigured. Files were changed from VSAM to dB2. In May of 1999, the new dB2 WQIS went online. The WQIS resides at the State Data Center in Jefferson City. WQIS allows online inquiry and updating (password is required). It is accessed through the State Data Center as a relational application program with several background COBOL processes.

Report writing is primarily done using Statistical Analysis System (SAS). Daily queries using SAS for management of data and permit renewal reports are performed on a monthly basis.

The WQIS database is broken into seven logically distinct categories; general facility information (point and nonpoint), permit limits, enforcement and inspection data, water quality monitoring and assessment data, grant information, facility monitoring data, and permit fees.

- The general facility portion consists of all basic information about a facility or site. These are point sources (discharges from treatment plants, etc) nonpoint sources (agricultural, etc), or any record that the staff needs to track (contract haulers of waste from permitted facilities) and all address information.

- The permit limits consist of any information on the state operating permit limits. It comes from reissued, new and modified permits.

- The enforcement and inspection data is derived from state inspections of facilities, self-monitoring and water quality monitoring data. Information on regional inspections, laboratory analysis data and Discharge Monitoring Data are entered as well as permit schedules, the enforcement status of state litigation and abatement orders.

- The water quality monitoring and assessment data is derived from self-monitoring reports, surveys, inspections, basin segment studies and Water Quality Standards. This data is compiled from inspection, monitoring data and Water Quality Standards for stream segments.

- The grant data consists of state, federal, storm water and other state matching grants for municipals supplied by the financial services section of the Water Pollution Control Program.

- The facility monitoring data comes from the department, submitted by the facilities and data entered by the regional offices. Major facilities have department data from 1984 while minor facilities have this data from 1994.

- The permit fees information contains all historic and current fees processed by the department since 1990.

Automated Tracking Systems

The Permits Action Tracking System, the Production Action Tracking System and the Enforcement Action Tracking System are systems developed individually that are now being linked together in ways that facilitate the department's business.

The most recent enhancements to the Water Pollution Control Program's main database, Water Quality Information System (WQIS), allow a direct link between WQIS and Geographic Information Systems (GIS) through a new field called the 'RF3 ID'. This will allow the department to graphically pinpoint a location and tell what Water Pollution Control Program facilities are upstream from any water segment in Missouri. This information is essential for Total Maximum Daily Load information and permitting. A water body number and first class stream name are now required for all permits. Basin names are being linked to U.S. Geological Survey Numbers to include 66 basins.

Project data will be updated on a continual basis as additional facilities are added to the particular water body segment. The water body segment data were derived from data loaded to GIS in 1998 for municipals, 1998 for concentrated animal feeding operations and 1999 for non-municipals. Facility locations tracked in this manner are nearing 5,000 in 2000.

In addition, Missouri feeds information to EPA's Storage and Retrieval (STORET), which displays the biological and physical characteristics of a watershed. All of Missouri's Water Quality Standards will be tracked in this system. Information from the Water Pollution Control Program's Water Quality Information System feeds data into the EPA's Permit Compliance System.

The department retrieves raw water quality data from the EPA database, from the U.S. Geological Survey database and from numerous state, federal and municipal sources. This data is imported into Missouri's computer system, WQIS, for storage and statistical analysis. The department maintains some water chemistry data in files at the state computer center. These files are retrieved and statistically analyzed.

Other special files, such as volunteer monitoring water quality data, herbicide levels in surface waters or groundwaters, levels of pesticides in fish tissue or results of toxicity testing of effluents and receiving water, are maintained in DBASE files within the department's Water Pollution Control Program. Data on permitted wastewater treatment facilities statewide, including results of effluent monitoring and as assessment of the water quality impacts of these facilities, is maintained in WQIS. The department is linking many separate databases pertaining to water quality, other environmental data and information on regulated facilities via Microsoft Access software and importing this data into a GIS environment. The Missouri Department of Conservation is in the process of developing statewide databases for both fish and aquatic macro-invertebrates.

Files are kept with the department on each watershed in Missouri. These basin files contain pertinent water quality information generated by any source considered to be reliable. Data generated in the program and from regulated entities under National Pollution Discharge Elimination System permit conditions is available in the WQIS database.

The department tracks the water quality attainment status of all classified waters. This tracking is an integral part of the 305(b) reporting process. The 305(b) report is required by the EPA and Congress every two years is a summary of water quality in Missouri and is developed each year through examining trends that become apparent in the monitoring data.

Water Quality Project Funding: Grants and Loans

There are a number of financial assistance opportunities available through the Water Pollution Control Program for point and nonpoint source water quality improvements. There are the Section 319 nonpoint source grants and the Clean Water State Revolving Fund (CWSRF) programs. The Clean Water Commission approved the development of this program in 1988. The CWSRF programs combine both federal funds and state matching funds from the sale of water pollution control bonds issued through the Environmental Improvement and Energy Resources Authority, EIERA, (an instrument of the State with authority to issue state water pollution control bonds) and other programs.

Nonpoint Source

- **Nonpoint Source (NPS) Mini-grants:** Funded under Section 319 of the Clean Water Act, these general guidelines are the same as NPS Project Grants; project length may not exceed 18 months. The maximum grant is $5,000, requiring a 60 percent federal match and a 40 percent nonfederal share of the project total. Applications are accepted and reviewed quarterly.
- **Nonpoint Source (NPS) animal waste treatment facility loans:** Low-interest State Revolving Fund loans are available from the department through the Missouri Agriculture and Small Business Development Authority. These loans are for small producers and farmers to design and construct animal-waste treatment facilities and to apply best management practices. Applications may be obtained from the development authority for all the eligible costs. Loan interest rates are at 5.3 to 5.8 percent.
- **Nonpoint Source (NPS) project grants:** These grants are funded under Section 319, and are given to governments and institutions of higher education to provide information, education or technical assistance relating to nonpoint source water pollution. Projects should demonstrate alternative pollution prevention practices and implementation to restore water quality. Research or activities that require discharge permits are not eligible. Project length may be up to four years; awards are made annually and range from $5,000 to $500,000.

Point Source

- **Rural Sewer Grant and Loan program:** This program provides grants and loans to rural communities and sewer districts for wastewater collection facilities. The maximum amount is $1,400 per connection, not to exceed 50 percent of the project cost. Voters approved additional funds for rural sewer grants and loans in 1998, and procedures and rules for distribution of these funds are nearing development. The application period is open.
- **Clean Water State Revolving Fund Loan Program:** The Clean Water State Revolving Fund loan program provides subsidized loans to any political subdivision of the state for construction of wastewater treatment facilities. Amounts are based on ability to repay debt. Application deadline is Nov. 15. The federal funds are matched with a 20% state match from the sale of state water pollution control bonds. These funds are administered jointly by the Environmental Improvement and Energy Resources Authority and the Missouri Clean Water Commission.
- **Clean Water Direct Loans:** This program is offered for upgrade and replacement of individual home treatment systems, potable water well drilling, agricultural waste treatment facility loans, interim loans for loan projects and match to the State Forty Percent grant program. Funds are from the repayments made to the State Revolving Fund.
- **State Forty Percent Construction Wastewater Grant program:** This program provides grants to communities and public sewer districts for wastewater treatment or collection facilities. The grant amount for this 40% grant program is limited to one-third of the actual grant funds appropriated or up to 40% of the eligible project cost.

Intended Use Plan

All state construction grant projects are divided into three parts in the Clean Water State Intended Use Plan for FY 2002, for example; the Carryover Fundable List, the FY 2002 Fundable List and the FY 2002 State Contingency List. The department has proposed a 25 percent grant, 75 percent loan program for the 40 Percent Grant Contingency List of projects on

a first come first serve basis. These funds are for the wastewater treatment needs of communities that have serious problems but do not have sufficient priority points to be funded. Grant and loan funds are committed only after communities vote the necessary debt security and have obtained department approvals for plans and specifications.

The Clean Water State Revolving Fund and the State Forty Percent Construction Grant Programs listed above are operated as parallel programs. Communities applying for assistance are directed to the appropriate program based upon a review of the credit risks associated with the project and size of the community. The CWSRF loan program is available to larger communities that have the financial capability to support repayment of a loan. Communities may appeal the department's decision during the public hearing for the department's Intended Use Plan and the State Grant Priority Lists. Projects that have sufficient priority to receive a Forty Percent State Grant may qualify for a direct loan under the State Revolving Fund, if requested.

The Clean Water State Revolving Fund loan application form and the State Forty Percent Grant application form for clean water loans involving federal grant funds to states is the same form. Loans are supported by federal capitalization grants awarded to the state. The department uses the application and financial information submitted to make an initial determination whether to include the project in the Clean Water State Revolving Fund loan or Forty Percent grant competition. When qualifying for a State Revolving Fund loan an applicant is asked to submit a separate Environmental Improvement and Energy Resources Authority Request for Financing during the plan and specification development phase of a project. In FY 2002, grant applications will be required to go through the Missouri Water and Wastewater Review Committee prior to submission for Department of Natural Resources administered grant and loan programs.

Capitalization Grants for Clean Water State Revolving Funds

EPA awards grants to states to capitalize their Clean Water State Revolving Funds. The state in turn may loan money received to agencies, programs or private entities for water quality activities. Payments made back to the fund are then available for new loans for high-priority water quality projects. Loans can be made to build public wastewater treatment facilities, the care and cultivation of forest trees (silviculture), rural and urban run-off control, wet weather control including storm water and sewer overflows, alternative wastewater treatment technologies, and landfills and riparian buffers.

The Clean Water State Revolving Loan Fund provides money to states for wastewater projects. State Revolving Funds are capitalized with a federal grant and a 20 percent state match. The state's large pool of wastewater designated money serves as the basis for a typical State Revolving Fund program. A typical State Revolving Fund program would begin with a bond issue, where the fund's bond proceeds are loaned out to various municipalities to fund wastewater projects. Today's revolving fund financed projects are somewhat smaller-scaled than the grant programs of the past, which created today's infrastructure. Directed on the state level, the revolving fund program is under state management, oversight and involvement. Thousands of loans have been made to municipal and wastewater utility participants to date. No participant borrower has ever defaulted on an obligation to its State Revolving Fund pool. Missouri ranks 10th nationally in terms of loans and fourth nationally in terms of loan repayments.

Please see the Clean Water State Revolving Fund and Loan Closing charts in Appendix D.

Federal Special Infrastructure Grant (FSIG)

FSIG monies, coming from the House Report 2684, Department of Veteran Affairs and Housing and Urban Development and Independent Agencies Appropriation Act, 2000, are made available to communities in southwest Missouri for phosphorus control at their wastewater treatment plants. Funds through FSIG may go to communities having a population of 50,000 or less and have wastewater discharges to the Table Rock Lake Watershed. Grant funds are to be provided on a 55 percent federal, and 45 percent local share basis.

The EPA determined that the State Revolving Fund couldn't be used for the local share. To bridge the gap the Missouri Department of Natural Resources is proposing a 25 percent state matching grant under 10 CSR 20-4.020 and offers a 20 percent local match that mirrors the EPA construction grant program from which the SRF program originally developed. Eligible participants may be considered for a state direct loan to provide the 20 percent match, if requested. State funds for grants and loans to match the federal infrastructure grant are provided through state bonds approved by voters in 1998.

State Hardship Grant Loan Program

The hardship grant is available to communities with a population of 3,000 or less that meet certain employment and income criteria. Grant percentage is adjusted according to user charge and a zero percent state direct loan is available to eligible recipients.

Voter Approved/Bond Financing

In FY 2000, the Missouri Department of Natural Resources approved $9,615,622.55 in grants for Missouri communities improving wastewater treatment. A listing of those communities receiving the grants may be obtained from the Water Pollution Control Program. The grants were possible due to a voter approved bond issue request in 1998.

Storm Water Grant and Loan Program

Grants and loans from this program finance projects in first class counties, communities within those counties, and any city not within a county for storm water control plans, studies and projects. Grants are not to exceed 50 percent of the project cost. Funds for this program were approved by voters in 1998. Procedures and rules regarding distribution of these funds are under development.

Water Pollution Equipment Sales Tax Exemption

This is a tax incentive program that is available to individuals, corporations or any public entity that purchases machinery, equipment, appliances and devices used solely for the purpose of preventing, abating or monitoring water pollution. Qualifying equipment, devices, etc., would be exempt from state sales tax.

Cooperative Financing: Missouri Water and Wastewater Review Committee

In order to utilize state and/or federal funding to finance water or wastewater system improvements, a preliminary project proposal, the Missouri Water and Wastewater Project Proposal, must be completed. The project proposal and engineering report are submitted to one of the Missouri Water and Wastewater Review Committees. The project proposal is reviewed within 30 to 45 days. The review committee replies to the applicant with comments on the technical, operational and financial aspects of the project proposal. The committee's comments must be resolved prior to receiving a recommendation from them. A recommendation from the review committee will state the appropriate agency or multiple agencies from which to seek financial assistance. A committee recommendation does not ensure funding from each appropriate agency. Each agency on the review committee receives a copy of all correspondence.

The Missouri Water and Wastewater Review Committee agencies include:

- Missouri Department of Economic Development
  Community Development Block Grant Program
  301 W. High St. P.O. Box 118
  Harry S. Truman Building
  Jefferson City, Missouri 65102
- Missouri Department of Natural Resources, DEQ, WPCP
  State Revolving Fund
  205 Jefferson Street P.O. Box 118
  Jefferson Building
  Jefferson City, Missouri 65102
- U.S. Department of Agriculture
  Rural Development
  601 Business Loop 70 West
  Parkade Center Suite 235
  Columbia, Missouri 65023

Sources of Information

- The Environmental Improvement and Energy Resources Authority issues tax-exempt bonds, notes and commercial paper to qualifying public and private agencies. Bonds are repayable by those who construct the projects without guarantee of repayments by the state.
- Sales/Use Tax: The Missouri Department of Natural Resources provides direct financial assistance through the application of the sales/use tax for the purchase of water pollution control machinery and equipment from sales/use tax liabilities. Contact the department at P.O. Box 176, Jefferson City, MO 65102, or call the department at 1-800-361-4827.

Waste Management Improvements: The Missouri Approach to Concentrated Animal Feeding Operations (CAFOs)

The Missouri Department of Natural Resources approach to handling CAFO waste management has included the development of design standards for managing animal wastes as a nutrient resource in a commercial recycling system. All animal manure and contaminated storm water

are collected in storage structures and reapplied to the land as crop fertilizer. Producers who wish to have state approval of their systems may apply to the Department of Natural Resources for a letter of approval as a ”no discharge” system. No-discharge means that no processed waste may be discharged into a water body. A no-discharge system is one that does not discharge to state water except during extremely heavy rainfall. This approval documents that the facility qualifies for an exemption from federal permitting requirements under the National Pollutant Discharge Elimination System (NPDES). The system was designed to minimize chances of pollution getting into U.S. water. Individual permit requirements and best management practices for general permits as well as Letters of Approval require agronomic rates in land application of manure nutrients. If the owner, i.e. permittee, applies more than 100 lbs. of nitrogen per acre, then testing is required of the soil, wastes and crop, otherwise testing is not required. Regional office inspectors inspect farms to see that wastes are not over-applied or applied when there is no standing crop to take up the nutrients. (Water permits do not regulate air emissions. The Air Pollution Control Program determines whether or not air permits are required).

Missouri continues to implement a combination of voluntary and mandatory requirements for all size of animal feeding operations**.** Our permitting requirements exceed those of EPAs**.** In 1970 the “Missouri Approach to Animal Waste Management” design guidelines were published by the University of Missouri Extension in cooperation with U.S. Department of Agriculture Natural Resources Conservation Service and the Missouri Clean Water Commission. The guidelines recommend collection, storage and land application of manure nutrients and associated storm water so there is no-discharge to waters of the state except during a 1-in-10 year annual rainfall event. The Department of Natural Resources issues a voluntary “Letter of Approval” to producers that followed the no-discharge guidelines. The approval letter served as documentation that the operation was exempted from discharge permitting requirements. No-discharge design guidelines have continued to be updated over the years. Agency coordination is currently assigned to the Interagency Technical Work Group consisting of the Natural Resources Conservation Service, the University Outreach and Extension, and the Department of Natural Resources. Research on pathogens is ongoing.

In 1974, Missouri was delegated by the U.S. Environmental Protection Agency (EPA) to implement the federal National Pollution Discharge Elimination System permit program, which included permitting requirements on certain CAFOs. The delegation agreement included approval of the letter of approval program as documentation that the producer met the permit exemption criteria under federal rules. Thus the letter was considered an exemption document and not a permit. The letter of approval program was successful in reaching several thousand producers that installed no-discharge systems.

As with any waste handling operation, these no-discharge systems must be properly operated and maintained to prevent wastewater discharges and potential water quality degradation. Over the years, the number of operational problems have increased and department emphasis has shifted toward mandatory permitting and reporting requirements. The report of the EPA National Feedlot Work Group (1990-1992 data) found that throughout the nation there are a significant number of stream miles with water quality impairments due to CAFO discharges. Missouri ranked as having one of the best protection programs and one of the lowest number of stream miles impacted. Major industry expansion began in the early 1990s. The poultry broiler

industry increased in a five-country area in southwest Missouri, and new Class IA size hog farms increased in a five-county area in the northern part of state

In 1996, state law and regulations were revised to require permits for CAFOs of 1,000 animal units or larger and certain smaller operations, as defined in federal NPDES rules. The law also added some new requirements for Class IA CAFOs, or 7,000 animal units or larger. The remainders of the letter of approval, no-discharge design guidelines are still used as part of the permitting requirements. The voluntary approval letter program now applies only to animal feeding operations that are less than 1,000 animal units and that do not otherwise require a NPDES permit. If a discharge occurs from a feeding operation, a permit becomes required. The current state permitting rules exceed EPA minimum requirements under the NPDES regulations.

In March 1999, the EPA and U.S. Department of Agriculture (USDA) issued a Unified National Strategy for Animal Feeding Operations that includes development of new national guidelines and standards by EPA and USDA. EPA plans to develop revised federal rules for CAFOs by December 2002.

EPA proposed rules will require that the Natural Resources Conservation Service standards for nutrient and management waste utilization be used at permitted CAFOs, but EPA will be responsible for enforcement. National Resource Conservation Service (NRCS) has indicated that the standards will be based on best management technology but will not be able to directly predict water quality impacts or improvements. NRCS standards allow planning based on three options: 1) the Phosphorus Index, 2) Soil Phosphorus Threshold Values, or 3) soil phosphorus levels. The Phosphorus Index is the preferred option for planning purposes. NRCS has also estimated it will take several years to train the needed number of certified nutrient management specialists required to assist landowners under the new standards. NRCS does not plan to develop nutrient management plans for permitted CAFOs. NRCS is working to establish New certification programs to allow the private sector to qualify as “certified nutrient management specialists” in order to meet new EPA permit requirements for CAFOs.

Department of Natural Resources permitting rules already meet or exceed most of the expected EPA rule changes. EPA requirements not currently addressed in state rules are expected to include phosphorus nutrient standards, use of “certified nutrient management specialists,” and lowering the permitting threshold to smaller size operations. Under existing rules, there are about 350 CAFOs permitted in the state. This number could increase to 2,000 or more CAFOs needing permits if EPA lowers the permitting threshold from 1000 to 300 animal units. To implement the anticipated EPA changes, revisions to state rules are expected.

For more information on permits, contact the Water Pollution Control Program at 1-800-361-4827 or (573) 751-1300.

Please see the CAFO Map in Appendix A.

Mining and Silviculture

Mining: Surface and Subsurface Mining

The latest state assessment indicates that a total of 156 miles of streams are adversely affected by mining activities. Of which, 128 miles are affected by abandoned lead-zinc mined lands and 26 miles by drainage from abandoned coal mined lands. Abandoned lead-zinc mines and their tailings continue to impact waters decades after mining has ceased. Missouri's Superfund Program and the Land Reclamation Program are addressing these concerns. These programs are continuing long-term planning and remediation efforts.

The state has active and abandoned surface mines for a number of commodities. The most important mines in terms of amount of surface areas affected are coal, limestone and barite. Other common surface mining is for clay, sand and gravel.

The state has many flooded abandoned underground mines. These are predominantly coal mines (north central Missouri) and lead-zinc mines (St. Francois, Madison and Jasper counties). In the Joplin area, the shallow bedrock aquifer has elevated levels of sulfate and several heavy metals due to mineralization of groundwater in flooded mines.

Discharges from all areas, point or nonpoint, are required to meet the state's Water Quality Standards found in Missouri Department of Natural Resources' rule Water Quality Standards, 10 CSR 20-7.031. Facilities that have National Pollutant Discharge Elimination System (NPDES permits must comply with their permitted limits.

Source of Information

For more information, call the Missouri Department of Natural Resources Land Reclamation Program at 1-800-361-4827 or (573) 751-4041 or visit the Web site at http://www.dnr.state.mo.us/deq/lrp/.

Silviculture: Nonpoint Source Reduction: The 'Chip Mill' Issue

It is in the interest of the private landowner and industry to use the best available technical information during harvesting activities to maintain long-term productivity of soil forest resources. Gains in watershed protection are predictable when watershed protection practices are accomplished through nonpoint source pollution reduction measures. Emphasis is on the importance of clean water and steps that are effective in ensuring the continued production of clean water for Missouri's forests. Program direction is provided through a team effort. The following organizations provide direction:

- Missouri Department of Conservation, Forestry Division;
- Missouri Department of Natural Resources, Water Pollution Control Program;
- USDA, Natural Resources Conservation Service;
- USDA Forest Service Mark Twain National Forest;
- University of Missouri School of Natural Resources;
- Missouri Consulting Foresters Association; and
- Missouri Forest Products Association.

By definition, silvicultural practices are directed toward the creation and maintenance of a forest that will best fulfill the objectives of the owner. Cutting trees in a forest as part of a land use

change, as in the conversion of forest to pasture, cropland, non-forested wetland, urban expansion or another non-forest use, is not a silvicultural practice.

Correctly applied, silvicultural practices usually result in minimal, short-term pollution. In relation to land treated by agricultural practices, the amount of soil lost, frequency of soil disturbance, amount of chemicals used, and the acreage treated in silvicultural operations are small.

The state encourages the application of best management practices for responsible forest resource management that serves both the public's need for timber and other forest products and the public's need for soil and water resource protection, and fish and wildlife habitat preservation.

In the governor's Executive Order 98-16, the Department of Natural Resources was directed to condition future permits issued to chip mills and to limit the duration of the permit.

Information on silvicultural activities and watershed protection practices is provided as requested by the Water Pollution Control Program. Included are advantages and disadvantages of using the watershed protection practices and the availability of technical, mechanical and financial assistance through government agencies. An additional resource for information on methods of reducing nonpoint source pollution from silvicultural operations, "Missouri Watershed Protection Practices," is available without charge from the Department of Conservation. Published in 1997, the booklet contains management guidelines for maintaining forested watersheds to protect streams.

State Water Plan

The department, under the Water Resources Law**,** Section 640.415, RSMo, develops and updates a state water plan as a part of the Water Resources Program State Water Planning Process for a long-range and comprehensive statewide program for the use of surface water and groundwater resources of the state. The plan includes the existing and future need for drinking water supplies, agriculture, industry, recreational, and environmental protection as well as any other related needs. The Missouri State Water Plan Technical Volume Series is a part of the state resources planning effort. It provides basic scientific and background information on the location and geology of the water resources of the state for water quality management assessments and reports where groundwater and surface water conditions must be analyzed. There are seven volumes in this series. The Water Pollution Control Program provides information on water quality to the State Water Plan as a part of the state's resource planning efforts.

If you have any comment on the State Water Plan or would like to view Missouri publications, you may address your letters to the Water Resources Program, Geological Survey and Resource Assessment Division, P.O. Box 176, Jefferson City, MO 65102-0176 or send an e-mail to mowaters@mail.dnr.state.mo.us.

Phase I
The department completed a series of technical documents to provide basic information about Missouri's streams and rivers, groundwater, water use, water quality, interstate issues, hydrological extremes, and water laws. These basic documents support public participation and planning efforts at several levels.

Phase II
The second phase of the state water planning process is the identification of problems and opportunities in water use by the six regions of the state. These six regions match the six regional office territories of the department's Division of Environmental Quality . The division's regional office staff assist the Water Resources Program in preparing the six regional reports available on the department's web site.

Strategies for Improving Missouri's Surface Water Resources
Below are listed the department's goal and strategies from the Missouri Department of Natural Resources Integrated Strategic Plan, October 2000. The public has direct input into these action strategies by attending the Water Quality Coordinating Committee Meetings held monthly in Jefferson City and Columbia. Contact the department at 751-1300 or through cleanwater@dnr.state.mo.us for dates and times of meetings. The department's Integrated Strategic Plan can be found on the department's Web site at http://www.dnr.state.mo.us/deq/wpcp/homewpcp.htm

The goal of the Missouri Department of Natural Resources is to protect and enhance the quality and quantity of Missouri's water resources. The outcome will be improved surface water quality and quantity in the state. This outcome is measured by the percent of lake acres and stream miles that are safe and usable for the designated beneficial use.

Streams and lakes safe and usable for designated beneficial uses				
	1994	**1996**	**1998**	**2000**
Stream miles	51.7%	52.7%	52.7%	52%
Lake acres	84.6%	84.6%	85.4%	94%

- The objective by the year 2005 is to increase compliance with Water Quality Standards for 18.4 stream miles out of 275.9 stream miles polluted by animal waste, active and abandoned mine lands, domestic point source discharges, and industrial discharges and to increase compliance with Water Quality Standards for 3,012 lake acres out of 4,566 impaired lake acres

Water Pollution Control Strategies
- Implement the Conservation Reserve Enhancement Program to improve drinking water quality, protect public health, enhance wildlife habitat and effectuate the conservation of soil

and water on the agricultural cropland in the watersheds serving 58 public drinking water supplies in 36 counties.

- Conduct a comprehensive review of the Missouri Water Quality Standards, and propose changes to the Missouri Clean Water Commission.
- Issue grants and low-interest loans to assist in the construction of domestic wastewater and animal waste facilities.
- Provide protection of wetlands through purchase of wetland acreage when effective and appropriate for inclusion in the state park system.
- Remediate abandoned coal and metallic mineral mine lands to reduce water quality impacts.
- Through the Special Area Land Treatment program for soil conservation within watersheds, work with landowners to apply best management practices and establish agricultural nonpoint source projects.
- Prevent stream degradation by decreasing the run-off, sediment transport, nutrient leaching and the increased stream temperatures following timber harvest for chip mills, with the application of best management practices.
- Conduct Total Maximum Daily Load studies to identify both point and nonpoint sources of pollution, and facilitate the restoration of our rivers, lakes and natural aquatic habitats.
- Conduct special water quality studies to assess source impacts and better understand the interaction of pollutants and the aquatic environment.
- Develop and propose to the Clean Water Commission numeric biological criteria as a water quality standard in order to identify better those impacted streams incapable of supporting the expected biological community.
- Conduct water quality monitoring and assessment to ensure appropriate and timely treatment of waters that are showing deterioration that the desired changes in water quality or its beneficial use support.
- Implement Clean Water Commission directives to initiate the following rulemaking initiatives: Water Quality Standards for phosphorus, land applications standards for phosphorus, and permitting requirements for contract haulers for both poultry litter and other manure types.
- Process permit applications for discharges to waters with impaired water quality and incorporate Total Maximum Daily Load plans into permits such that the permitting program ensures the reduction of pollutants into impaired streams.
- Incorporate pollution prevention measures into the permitting process as an effective means to reduce physical and chemical degradation of streams.
- Amend the permitting and certification processes to: improve readability and enforceability; streamline procedures; incorporate public comments, resolve technical problems, and increase the frequency of inspections.
- Ensure that Missouri water quality meets standards and laws, through permitting, inspection and enforcement efforts. When necessary and appropriate for protection of our natural resources, promulgate new rules.
- Maintain interagency coordination and cooperation through the Water Quality Coordinating Committee, the Missouri Watershed Information Network, state and federal agencies, natural resources interest groups and private citizens.
- Promote the use of Environmental Management Systems to improve environmental performance by the regulated community and work with our partners in the White River Basin: such as the James River Partnership; local, state and federal agencies; and the

Arkansas Soil and Water Conservation Commission; to implement initiatives to improve water quality in the basin.

- Provide owner and operator training and technical assistance to improve performance and compliance of regulated facilities.
- Develop a comprehensive and long-range program for state parks and historic sites to comply with environmental regulations and codes for public providers including preventative maintenance for water and wastewater systems.
- Support multi-agency efforts to encourage application of best management practices in the watersheds of drinking water lakes impacted by farm herbicides.
- Implement Continuing Nonpoint Source Plan by supporting community-based watershed water quality projects.
- Update and revise design regulations and standards for Concentrated Animal Feeding Operations including incentives for technology that will meet both water quality and air quality standards.
- Assess the environmental impact of chip mills on the water quality of the state as well as on the forest products, the tourism and the recreation industry.
- Advocate positions that protect Missouri's interests through participation in river basin associations.
- Annually review reservoir operational plans as they impact hydropower generation, water supply and other beneficial uses.
- Locate stream gauges to monitor low flows on middle Mississippi River.
- Participate with technical and policy committees that may impact the White River.
- Monitor the activities and decisions of other states and the Army Corps of Engineers as they relate to water flow on major rivers and streams in Missouri.
- Improve the accuracy and reporting of flood and river stage information.
- Monitor proposed changes in the Missouri River Master Manual as they impact Missouri's flood control benefits, drinking water supplies, river commerce, environmental and recreation needs.
- Participate with the State Emergency Management Agency to activate Missouri's Drought Response Plan when conditions are dry.
- Determine present land use patterns for major river corridors, including agricultural, wetlands, commercial and recreational uses.
- Develop remote sensing capability for use in natural resource inventories. These inventories are needed to determine impacts of development on Missouri's natural resources.
- Promote and advocate flows required for water supply intakes, power plant cooling and wastewater discharges
- Promote and advocate increasing the number of rated river gauging stations by the Department of Natural Resources and other agencies, communities and interested parties. Gauge stations are needed to monitor flood flows, low flows during droughts and for calculating Total Maximum Daily Loads for water quality improvements.
- Revise the current hydrologic unit code for water quality assessment by working with the Missouri Unified Watershed Assessment Committee to facilitate prioritization of Missouri watersheds.

References

- Clean Water Act, Title II Section Grants for Construction of Treatment Works, and Title III Sections Enforcement and Compliance and Sections 604(b) and 106.
- The department's FY 2001 and 2002 Clean Water State Revolving Fund Intended Use Plan and State Grant Priority List.
- EPA State Water Pollution Control State Revolving Fund Manual, December 1988;
- State Revolving Fund Operating Agreement Environmental Protection Agency/Department of Natural Resources, June 1989(amended).
- State Revolving Fund FY 2002 Applications and Instructions: Wastewater Treatment Program Financing and Drinking Water Program Financing.
- Missouri Department of Natural Resources, Division 20, Chapter 4, Grants, 10 CSR 20-4.010 through 4.060.
- Missouri Department of Natural Resources, Division 20, Chapter 8, Design Guides, 10 CSR 20-8.010 - 8.500.
- Missouri Department of Natural Resources, Division 20, Chapter 7, Water Quality Standards, 10 CSR 20-7.010-7.031.
- Missouri Department of Natural Resources, Division 20, Chapter 14, CAFO Waste Management Systems Operations –10CSR20-14.010-20-14.030.
- Missouri Department of Natural Resources, Division 20, Chapter 3, Enforcement, 10 CSR20-3.010, Penalty Assessment Protocol.
- Department of Natural Resources, *Integrated Strategic Plan 2000-2005*: http://www.dnr.state.mo.us/s_plan/fy2002/index.html.
- Clean Water Act, Section 319; Missouri NonPoint Source Management Plan, July, 2000: http://www.dnr.state.mo.us/s_plan/fy2002/index.html.
- EPA published Section 319 nonpoint source grants guidance documents: http://www.epa.gov/owow/nps.

Sources of Information

- *Amendments to Final Sewage Sludge Use and Disposal*, Feb. 1994, EPA #822-F-94-001.
- *Strategy for Municipal Wastewater Treatment*, November 1990, (1-800-553-NTIS).
- *Preventing Pollution Through Efficient Water Use*, July 1990, EPA #20W-0002.
- *Permits Compliance Systems: Public Access to PCS Data Products*, May 1993, NTIS, PB95-158853, (1-800-NTIS);.
- *Combined Sewer Overflow (CS0) Control Policy*, April 1994, EPA #830-B-94-001.
- *Alternative Funding Study – Water Quality Fees and Debt Financing Issues – Final Report to Congress*, June 1996, EPA #832-R-96-001.
- *The National Water Quality Inventory 1996 Report to Congress*, April 1998, EPA #841-R97-008.
- *The Quality of Our Nations Waters*, A Summary of the National Water Quality Inventory 1998 Report to Congress, June 2000, EPA #841-5-00001, can be accessed http://www.epa.gov/305b/98report/index.html.

- These publications and other technical sources including Needs & Assessments, Construction Grants, Finance, Treatment, Pollution Prevention, Permitting etc. can be accessed through http://www.epa.gov/owm/catpub.htm.
- *Protecting Water Quality, a field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas.* Revised by the Mid American Association of Conservation Districts (MAACD). Published as a revised manual and funded by EPA Region 7 through the Missouri Department of Natural Resources under Section 319 of the Clean Water Act.